COBRA

THE BASE CLOSURE COST MODEL

Report PL809R1

May 1989

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Prepared pursuant to Department of Defense Contract MDA903-85-C-0139. The views expressed here are those of the Logistics Management Institute at the time of issue but not necessarily those of the Department of Defense.

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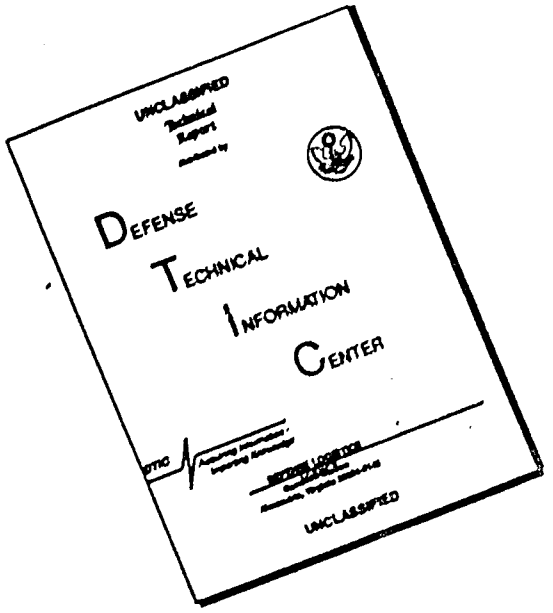

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SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION / AVAILABILITY OF REPORT "A" Approved for public release; distribution unlimited.
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) LMI-PL809R1	5. MONITORING ORGANIZATION REPORT NUMBER(S) DOD/SW/DK-90/006a
6a. NAME OF PERFORMING ORGANIZATION Logistics Management Institute 6b. OFFICE SYMBOL *(If applicable)*	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS *(City, State, and ZIP Code)* 6400 Goldsboro Road Bethesda, Maryland 20817-5886	7b. ADDRESS *(City, State, and ZIP Code)*
8a. NAME OF FUNDING / SPONSORING ORGANIZATION Defense Secretary's Commission on Base Realignments and Closures 8b. OFFICE SYMBOL *(if applicable)*	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER MDA903-85-C-0139
8c. ADDRESS *(City, State, and ZIP Code)* 1800 K Street, N.W. Suite 302 Washington, D.C. 20004	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO / TASK NO. / WORK UNIT ACCESSION NO.
11. TITLE *(Include Security Classification)* COBRA - The Base Closure Cost Model	
12. PERSONAL AUTHOR(S) Douglas M. Brown	
13a. TYPE OF REPORT Final	13b. TIME COVERED FROM July 88 TO April 89
14. DATE OF REPORT *(Year, Month, Day)* April 1989	15. PAGE COUNT 75
16. SUPPLEMENTARY NOTATION For diskette see:	

17. COSATI CODES		
FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS *(Continue on reverse if necessary and identify by block number)*
Base Closing, Overhead, Transfer, PCS, BOS, RPMA. (EG)

19. ABSTRACT *(Continue on reverse if necessary and identify by block number)*

This report presents the assumptions and calculations used in the COBRA model. That model was used by the Defense Secretary's Commission on Base Realignments and Closures to evaluate the economic feasibility of alternative scenarios.

The model considers one-time and recurring costs in determining the payback period for each scenario. The model has been updated to include enhanced features and to address definitional issues at the request of the General Accounting Office.

LMI recommends that this model be used as a reference point in future DoD or Service estimates of realignment and closure costs.

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL Douglas M. Brown	22b. TELEPHONE *(Include Area Code)* (301) 320-2000	22c. OFFICE SYMBOL N/A

DD FORM 1473, 84 MAR — 83 APR edition may be used until exhausted. All other editions are obsolete

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

ACKNOWLEDGMENTS

We developed the Cost of Base Realignment Action (COBRA) model for the Secretary of Defense's Commission on Base Realignment and Closure with the active assistance of all of the uniformed Services. Particularly important was the work of Mr. Scott Belford of the Air Force Cost Center, who developed a standard-factors-based model without which the COBRA model could not have been developed in the time available. John Anderson, LTC, U.S. Army, and Andy Eckert, LCDR, U.S. Navy also provided extensive assistance.

The model has undergone exhaustive validation by Mr. Emil Friberg of the General Accounting Office, whose challenging questions greatly improved the precision of the model.

The completeness of the documentation package is the result of the effort of Mr. Van Bandjunis, who supervised the Commission's cost task force, kept it moving, and recorded its progress.

Executive Summary

COBRA – THE BASE CLOSURE COST MODEL

The Secretary of Defense's Commission on Base Realignment and Closure undertook the difficult task of comparing alternative proposals. The Commission evaluated the alternatives with both military effectiveness and economic feasibility as key criteria. To provide adequate treatment of the economic feasibility criteria, the Commission needed a cost model. The Cost of Base Realignment (COBRA) model was developed to serve that function.

COBRA was developed using existing data available from the Military Departments. Extensive field studies were obviated by the highly sensitive political environment involved in the Commission's tasks. Nonetheless, we believe the COBRA model provides realistic estimates of realignment costs.

The model calculates one-time and recurring costs and savings based on major-command-wide standards and scenario-specific estimates. The use of these standard factors and estimates makes the model inappropriate for use in preparing detailed budgets; instead, it provides a means for comparing alternatives for the Commission's decision-making.

This report explains the decision variables incorporated in COBRA, defines the assumptions that were made, shows how the available data and standard factors are combined to produce the cost estimates, and explains how to interpret the summary output.

The model was developed in coordination with the uniformed Services and has been reviewed by the Congressional Budget Office (CBO) and the General Accounting Office (GAO). We recommend that COBRA be used as a departure point for realignment or closure decisions in the future.

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CHAPTER 1

INTRODUCTION AND OVERVIEW

The Cost of Base Realignment Actions (COBRA) model was developed by the Logistics Management Institute (LMI) for the Secretary of Defense's Commission on Base Realignment and Closure. COBRA provides cost comparisons of proposed base realignment actions using data that was available to Service staffs without extensive field studies.

The Commission process was to identify "losing" bases with mission deficiencies, to identify "gaining" bases which might be able to absorb some or all of the activities currently operating on the losing base. Then the Commission determined the expected costs of, and savings to be achieved by, the proposed moves. The COBRA model is the linkpin joining those considerations. The model estimates the cost of the major actions associated with the transfer of activities between bases and, if appropriate, the disposition of assets at closed bases. It reports the costs in terms of key decision parameters which were used by the Commission to review each scenario independently and as part of an entire package to determine if the costs were justifiable in view of the expected return.

DEFINING A SCENARIO

Before any form of analysis can be done, the environment must be established. In this case, the identification of losing and gaining bases was accomplished by the Services under Commission ground rules and review. The Services then produced diagrams which portrayed the proposed relocations: an example is shown in Figure 1-1. This set of moves is referred to in this report as a scenario, and the chart itself is known as a migration diagram.

The migration diagram clearly consists of one losing base -- the base from which missions are being removed -- and up to six gaining bases. Note that in this example, one of the gaining bases has been labeled "Base X." That base represents the dispersal of personnel to installations throughout the Service to fill vacant positions. It is used to ensure that all personnel from the losing base are completely accounted for through transfers to the major gaining bases, transfers to the force

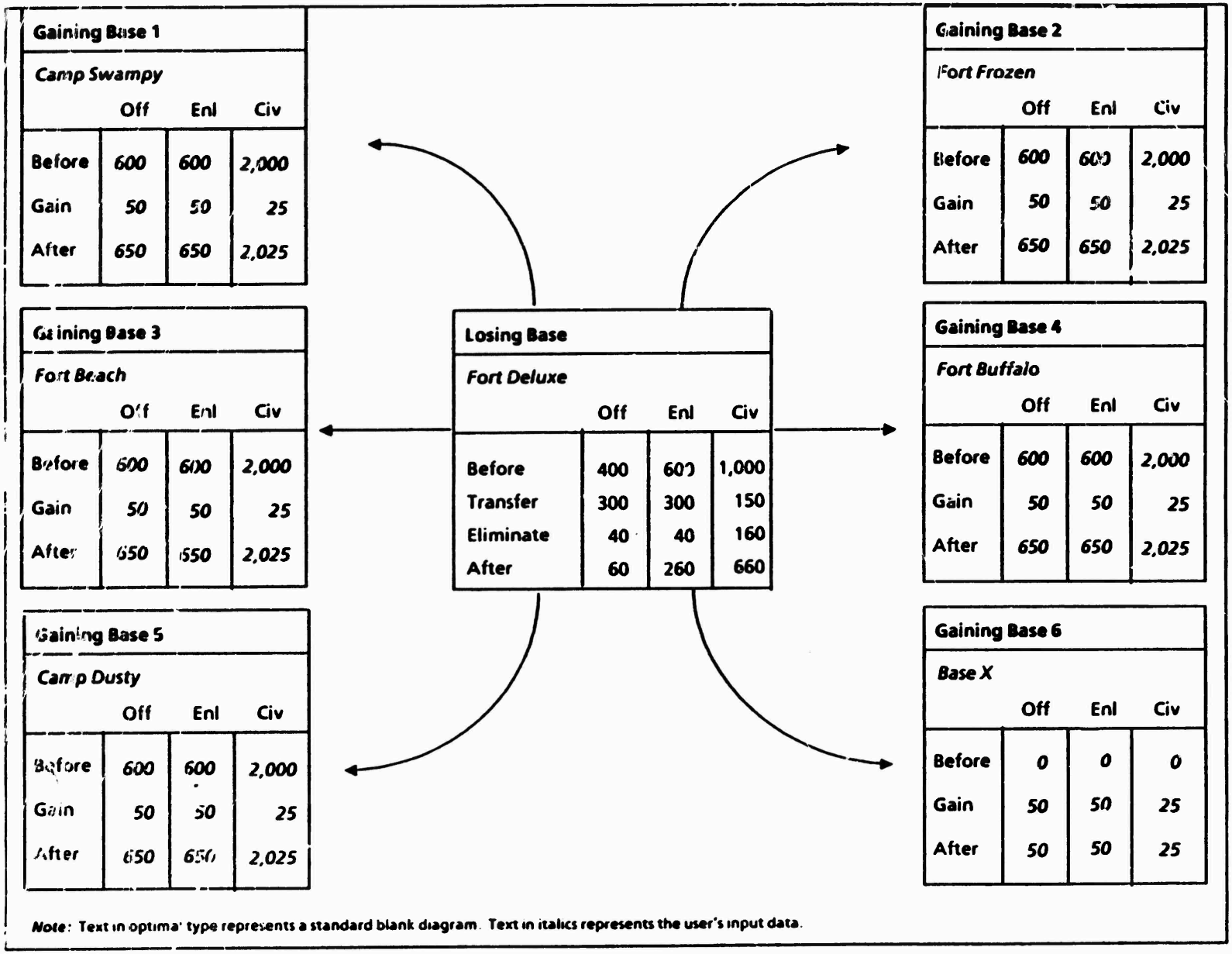

FIG. 1-1. MIGRATION DIAGRAM

structure at large, or personnel position eliminations. The distinction between unspecified transfers and position eliminations is significant because eliminated positions (i.e., reduced total position authorizations) allow the Services to save salaries, whereas transfers do not. This concept is critical to the costs and savings predicted by the model because salaries are such a large component of base costs.

COBRA is able to model three types of scenario:

- Closures, in which all the activities are transferred away from the losing base and the property is sold. Some costs are incurred to prepare the base for sale.
- Deactivations, in which most of the activities are transferred away from the losing base, and a caretaker force is left in place to provide a minimal maintenance and security capability.
- Realignments, in which some activities are transferred away from the losing installation but it continues to operate. In realignments, caretakers are not specifically accounted for, as it is assumed that existing tenants will be assigned to maintain excess space; and family quarters are filled by drawing families from off-base housing.

DECISION PARAMETERS

Once the scenario has been defined and appropriate base data collected (the input data requirement is discussed in detail in Chapter 2), COBRA estimates the costs and savings associated with the move over a 20-year period and reports the decision parameters.

Those parameters are determined in part by the Commission's charter, which states some required considerations, and in part by the need to explain the results in terms which can be related to popular concepts of costs and savings.

Payback Period

The most important of the decision parameters was the payback period. It was specifically required by the Commission charter, in which it was defined as the time in years from the date the closure is complete until the accumulated savings meet the initial cost required to close the base. Figure 1-2 provides a graphic explanation of this concept. Further, the charter required that this period not exceed 6 years. Although the charter did not specify whether this applied to each scenario or to the entire package of recommendations that the Commission delivered, the

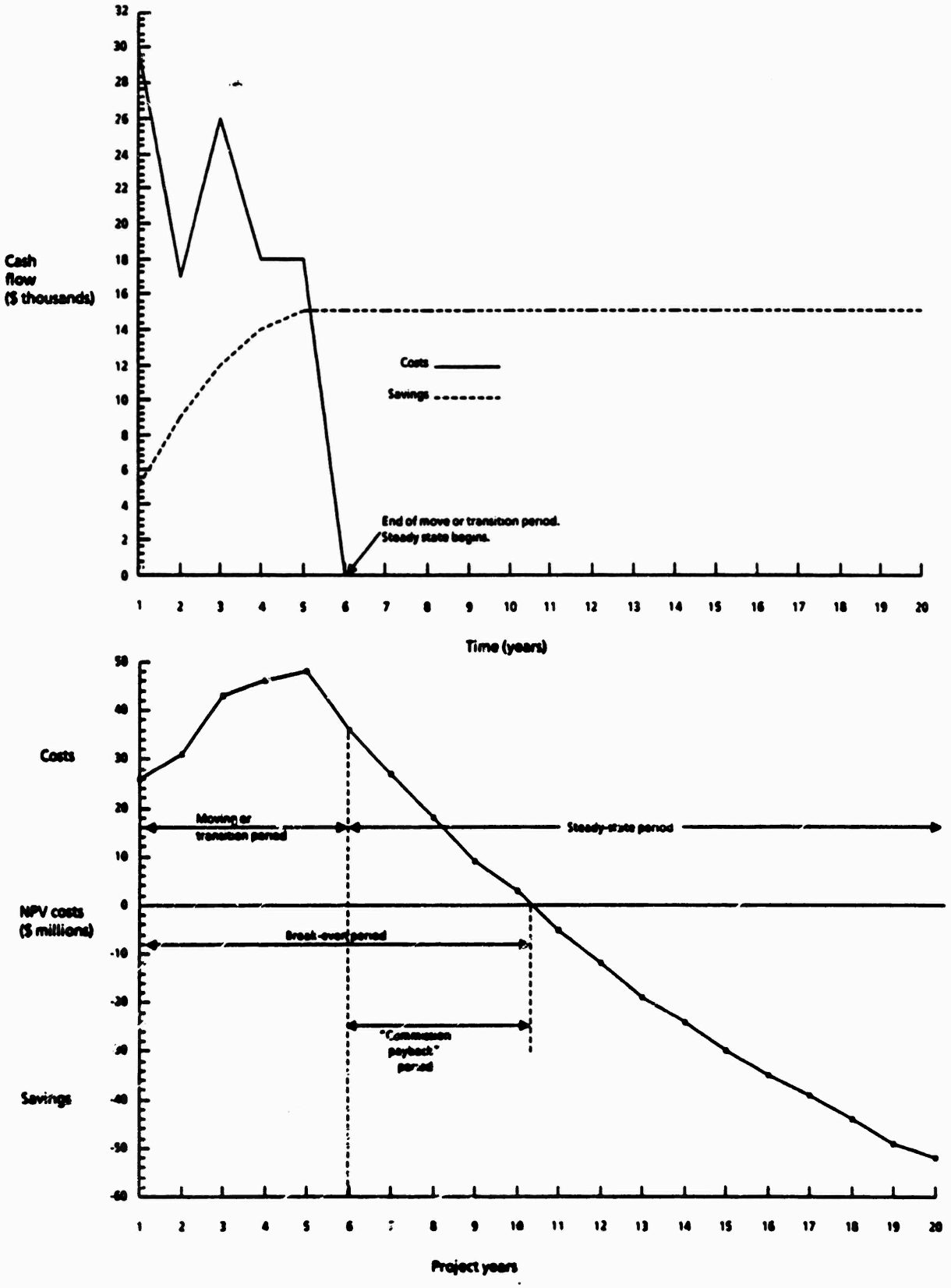

FIG. 1-2. PAYBACK

Commissioners decided to be conservative and apply this criterion to each scenario considered.

Figure 1-2 defines three key terms that are used in the rest of this text. The breakeven period is the time from the beginning of the scenario until the total savings exceed the total costs. The transition period starts at the beginning of the scenario and continues until all actions in connection with the transfers of activities are complete. As can be seen from the figure, the termination of the actions is clearly shown by the elimination of all one-time costs; all that remain are recurring costs, which stabilize at a given level for the scenario. This constant, enduring level portrays the steady-state savings or costs; clearly, the transition period ends and steady-state begins simultaneously. The payback period, then, as defined by the Commission charter, is the period between the achievement of steady state and the breakeven point.

Net Present Value (Cost or Savings)

The breakeven period is calculated using the Net Present Value (NPV) of all costs and savings occurring in each year. NPV is displayed for a 20-year period to identify the effective value of the proposed scenario. This was necessary for two reasons. First, in some cases, the initial sales of land can overshadow an increase in the overall activity operating cost; thus, activities can achieve immediate payback in that one-time costs are covered by the land sale but expenses increase in later years. In such cases, the NPV demonstrates an overall cost even though payback appears to be immediate.

In addition, the use of an NPV places all scenarios on an equal footing in terms of the timing and scope of cash flows. This allows the aggregation of costs and savings to summarize the total effect of the Commission's recommendations, and allowed the Commission to select between greatly dissimilar scenarios developed for the same bases.

The NPV of a stream of cash outlays or savings is the single sum of money (principal) that would have to be invested at current interest rates (discount) in order to produce the income necessary to offset these expenses or to match the savings. The model uses a 20-year cash stream to calculate the NPV. That period was chosen because it has been used by DoD in a number of other studies and because the inaccuracies in the assumptions and the data make further calculations

meaningless. For instance, a dollar 20 years from now would be worth less than 15 cents today because of the combined effect of inflation and interest accumulation. Beyond 20 years, costs and savings, however large the face value may be, become relatively insignificant.

Net Transition Costs or Savings

The net transition costs or savings represents the initial spending (the investment) required to implement the scenario, and includes all disbursements and receipts during the transition period. This would include both one-time or event-driven costs and savings (such as the cost of transferring personnel), and recurring costs or savings which adjust as the situation develops, but recur annually at some level even if no specific action is taken (for example, payment of salaries). The model reports this information in constant-year dollars.

Land Value

Land value is included in the transition costs and savings as defined above. It is provided as a separate decision parameter because land transactions make up a very significant proportion of the entire transition costs and savings. Many observers have questioned the achievability of fair market value for Federal land, given the historical tradition of giving it away for free in order to reduce community dislocations; however, failing to recognize the market value of the land also denies decision-makers an assessment of the magnitude of the economic decision that they make in sacrificing the revenue from land sales. The land value was therefore provided to show the relative importance of land in the total savings to be achieved by the planned closure, and thus the impact on a closure scenario if land sale is not permitted. The value is a net value, including both the proceeds from expected sales and the cost of any land that must be purchased at the gaining bases.

Annual Steady State Savings

Steady-state savings represent the net annual savings that can be expected once the scenario is implemented. We use the term "savings" rather than "costs and savings" because only those scenarios in which the savings exceed the costs are acceptable, otherwise the scenario could not achieve payback. These savings include only recurring costs or savings, and are expressed in constant dollars that is, the costs incurred in FY88.

WHAT COBRA DOES

COBRA estimates the overall cost of, or savings achieved through, a base closure or realignment in terms of several elements of cost. Some costs (or savings) are incurred once as a result of a specific event; others occur as a result of a changed situation and recur annually after the change is effected. In general, one-time costs and savings are determined by details of the proposed scenario (such as transporting a given quantity of freight over a specific distance) while the recurring costs and savings are created as a result of fundamental differences between the bases such as different per capita operating costs, different housing allowance levels, or a change in the total number of personnel required as a result of moving to the gaining base.

COBRA makes two types of calculations based on these two categories of costs and savings. One-time costs are computed as standard charges for item-by-item actions; in doing so, the model applies Service-wide standard costs and factors to scenario-specific inputs. Recurring costs and savings are computed by comparing the cost of specific services at the gaining and losing bases and predicting how much it would cost to perform the transferred services at the gaining base. Each service or action forms a cost element of the model.

COBRA calculates the one-time and recurring cost elements for each year, and sums them to determine a net cash flow. That cash flow is then subjected to net present value analysis, as discussed previously, to determine the payback period.

Costs and Savings Modeled

- The following one-time costs are assessed in the model:
  - Administrative planning and support costs
  - Personnel actions costs: severance pay, early retirement pay, new hiring costs
  - Moving costs: per diem allowances, househunting costs, house sales allowances
  - Transportation costs: air fares, automobile mileage allowances
  - Freight costs: household goods, heavy equipment, miscellaneous
  - Unique one-time costs: environmental mitigation, special equipment or transportation requirements

- New construction costs: planning/designing, constructing, repairing
- Shutdown costs

- The following one-time savings are assessed in the model:
  - Procurements and construction costs avoided
  - Real property net proceeds
- The following recurring costs and savings are assessed in the model:
  - Increased Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) costs
  - Caretaker costs at deactivated bases
  - Changes in housing costs
  - Salary savings after personnel reduction
  - Changes in base overhead costs for the moving activities: Real Property Maintenance Activity (RPMA), Base Operating Support (BOS), Family housing
  - Changes in mission costs resulting from mission operating efficiencies.

Costs Not Modeled

The following costs were ignored because they were equal in all scenarios:

- Nonappropriated fund activities. These activities are largely funded out of Service members' pockets and not through appropriated funds.
- On-base schools and school impact aid. These costs vary greatly and are funded at widely different percentages of the authorization.
- Salary components of base overhead costs. These costs were picked up through personnel redistribution figures.
- Cost of moving very small activities. The Commission did not require activities with less than 100 military or 50 civilian employees to be specified in closure scenarios. The model could handle such transfers, but the information required to account for them is excessive in view of the small cost involved. These costs are minimal because in most such cases, the transfer of personnel can be accomplished within the 5 model years through the normal rotation of personnel; because these activities tend to have very little equipment; and because all four Services state that such small

activities can easily be absorbed into excess space on large bases at a negligible increase in overhead.

Scenario Timing

The following time baselines were established:

- The model collects costs assuming constant FY88 dollars, thus avoiding excessive speculation about inflation rates.
- Personnel counts are based on FY88 authorizations.
- Year 1 in the model is entirely arbitrary, depending on when the first action in the scenario occurs. The model does allow the user to specify the calendar year for Year 1, but this can vary from scenario to scenario. The Commission model had no standard Year 1, but the constraints of the legislation caused all participants to treat that year as Fiscal 1991.

MODEL ASSUMPTIONS

The output of COBRA, while not intended for budgetary purposes, is sufficiently accurate to rank order realignment scenarios for decision-making purposes and to provide estimates of the total cost of a relocation. In addition, COBRA makes extensive use of Service- or Major Command-wide standards; these standards tend to compress real data into arbitrary categories, a process which itself is in the nature of an assumption. The standard factors are listed in Appendix B.

We made the following additional assumptions:

- Administrative planning and support. There will be an increase in current overhead costs to account for extra travel, communications, etc., as the realignment plans are developed and executed.
  - That increase has been estimated at 10 percent of the losing base's current BOS costs in the first year, decreasing by 25 percent in each following year.
- Personnel actions. When civilian positions are transferred from one base to another, not all the civilians move. Some will retire early, some will resign positions as a matter of routine, and some may have to be separated if insufficient vacancies remain.
  - All relocating civilian employees have families.
  - Eight percent of affected civilians select early retirement in lieu of transfers; those persons are then paid a proportion of their retirement pay for the first 3 years of the model, after which we assume that the

persons would have retired anyway (and their further retirement pay is therefore not due to the transfer action).

- The Priority Placement Program, whereby civilians whose positions are eliminated are given top priority for new vacancies, is 75 percent effective.

- Personnel relocation and transportation. Relocations of less than 50 miles from the original installation incur no personnel relocation costs.

- Freight. Each military and civilian employee is supported by a standard weight of administrative material (750 pounds).

- Construction.

  - Unless an engineering estimate is available, construction needs are aggregated into a single dollar figure. That cost is then spread out over the transition period in proportion to the people moving from the losing to the gaining bases each year.

  - The model does not attempt to break out which facilities must be completed first, except that all family quarters are assumed to be completed in the first moving year.

  - A planning and design cost of 10 percent of the total construction bill is levied in Year 1 of the model.

- Caretaker costs. A losing base in a realignment scenario is assessed no charges for caretaker maintenance or shutdown costs because we assume that the remaining activities will absorb excess space.

- Housing.

  - Departing families occupy base housing at the losing base in the same ratio as the overall base family population. When families depart, the on-base housing is filled by other off-base families. Thus, no housing savings are realized unless the base is completely closed.

  - If the base is closed, housing savings begin in the year after the closing year and amount to the total housing budget.

  - All bachelor officers live off base; all bachelor enlisted personnel live on base.

- Base overhead. For the Commission's purpose, each Service has a different formulation for base overhead costs. For all Services but the Navy, they consist of RPMA and BOS costs. The Navy uses Major Repair Program (MRP) and Other BOS (OBOS) costs. The following variables determine the expected budgets for those costs:

TABLE 1-3

BASIS FOR OVERHEAD COSTS

Cost	Army	Navy	Air Force	COBRA
RPMA/MRP	Personnel	Plant Value	Square Feet	Square feet and acres
BOS/OBOS	Personnel	Personnel	Personnel	Personnel

The COBRA model uses an exponential combination of the variables, in the form, Cost = ax^b. This treatment is explained in detail in Appendix A. The Services did not have the capability to develop the data to support use of this formulation during the Commission's tenure and had to rely on less realistic linear expressions.

THE STANDARD FACTOR TABLES

COBRA contains four tables of standard factors. Those factors are standard in the sense that they are common to all scenarios developed by a single Service or agency. The standard factors are combined with the input data to produce the estimate. The equations by which the estimate is calculated are explained in Chapters 3 and 4. A complete list of the values of the standard factors is provided in Appendix B.

STRUCTURE OF THE DOCUMENTATION

The body of this report explains the purpose of the model, defines the assumptions that were made in the interest of clarity and expediency, shows how the input data and the standard factors are combined in equations in the model to produce the estimate, and explains how to interpret the summary output.

In Chapter 2, the input definitions are presented. In Chapter 3, we explain the equations used to calculate the one-time costs and savings, and in Chapter 4, we provide the equations used to assess recurring costs and savings. In Chapter 5, we demonstrate the combination of the cash flows into a "payback" solution, and explain how to interpret the model output.

Appendix A presents the rationale for the selection of an exponential overhead cost algorithm. The standard factors that distinguish the different Service models

are displayed in Appendix B. Appendix C lists all the input data elements that are needed to run the COBRA model.

CHAPTER 2

MODEL INPUTS

COBRA requires four types of data input to produce a scenario cost estimate. Those types are: Scenario Definition, Base Statistics, Construction Inventories, and Other Inputs. This chapter summarizes the input requirements; details of the input requirements may be found in Appendix C.

SCENARIO DEFINITION INPUTS

The user must define the scenario to be estimated.

Scenario-Wide Definition

As explained in Chapter 1, this definition includes:

- Type of scenario (closure, deactivation, or realignment).
- Last year of action (i.e., the year before "steady state" begins).
- Close year. The year in which real property is to be sold. This data element is also assumed to be the year in which shutdown occurs (if not otherwise specified), housing savings begin to be realized, and CHAMPUS costs begin to be incurred.
- Year 1. The year in which the scenario begins.
- Inflation and discount rates.

Transfer Data

- Names of the losing and gaining bases.
- Distance. The distances in miles from the losing base to the gaining bases. If the distance is less than 50 miles, no personnel transfer or freight costs are assessed.
- Moving mission and support equipment. The weight in short tons of all the transferring mission and support equipment other than the vehicles (accounted for below).

- Military light vehicles. The number of vehicles which will be driven to the destination.
- Heavy or special vehicles. The number of vehicles that must be transported to their destinations because it is impractical or too expensive to drive them.
- Environmental mitigation requirements. The cost of putting environmental mitigation measures into place at the gaining bases.
- Special one-time costs. These are unique one-time expenditures which cannot be portrayed properly anywhere else in the model. Such costs may be special transportation costs for high-value equipment, or new acquisitions of equipment or facilities which cannot practically be transferred from the closing base.
- Position Transfers.
  - Affected personnel at the losing bases include all mission and overhead military and civilian personnel. Caretaker forces for the years after buildings are closed are identified separately. At the gaining bases, the positions are all those positions newly created, both mission and support, to include those positions that will be dispersed into the Service's force structure, as represented by Base X.

Real Property Transactions

- Facility square feet shut down. The total square footage of space no longer used after the moves.
- Real property purchases. Real property purchases include sales of property at the losing base and any purchases needed at the gaining base.
- Year excessed. The year in which real estate proceeds are expected to be realized. Purchases are assumed to be necessary in Year 1.

BASE STATISTICS

Base statistics are used to describe the bases involved in the scenario so that their operating costs can be compared and an assessment can be made of the probable impact of the scenario on each base's costs.

Physical Environment

- Base total military employment, civilian employment, facilities, and acreage.
- Housing units vacant.

- Families living on base (%). The percentage of military families living on the closing base as compared with the total number of military families assigned to the base.

Base Expenditure Data

- Base costs. These costs are used to calculate the change in each base's overhead as a result of changing support requirements.
  - RPMA budget: The total RPMA budget, less any portion spent on housing (program element code [PEC] xxx94). The payroll and nonpayroll components of this cost are treated separately to avoid double-counting of the personnel savings, already identified through the personnel position data.
  - Communications budget. The base communications budget (PEC xxx95).
  - Base operations budget. The total base operations budget (PEC xxx96). Again, direct hire (military or civilian) payrolls are accounted for on separate lines.
  - Family housing budget. The total family housing budget for the base.
- Activity mission costs. This data element is used to capture the increased efficiency in mission costs (PEC xxx97) achieved by a realignment of activities.

CONSTRUCTION INVENTORY

The construction data elements are used to convert predictable space requirements into a dollar-value construction cost in a systematic way, avoiding subjective snap judgments on the possible cost of new facilities.

- Gaining area cost factor. The tri-Service construction cost factor that adjusts for regional cost differences.
- Requirements. Based on the type of activity being transferred, a minimum facilities configuration is required to support the force. This data element records the square footage requirements, by building category, for each of the gaining bases. Base X has no construction requirements.
- Capacity. The available excess square footage on each gaining base. This represents the base's capacity to accept a new activity without new construction.
- Rehabilitation. The number of square feet of available capacity on each gaining base that is in need of rehabilitation before it can be used

effectively. The model requires all excess space to be rehabilitated before new construction is permitted.

OTHER INPUTS

- Personnel costs.
  - Officer and enlisted VHA (variable housing allowance). The VHA for each base using the weighted average by grade.
  - Per diem. The permanent change of station (PCS) per diem rate.
- Cost avoidance. These data are used to record one-time savings.
  - Construction. The value of construction that has entered or passed the design stage, by year, which will no longer be necessary if the base closing or the intended using activity is transferred.
  - Procurements. The value of current contracts *not* included in mission, RPMA, or BOS costs. This level of expenditure is assumed to continue through the outyears.
- Freight costs per ton-mile. The cost to transport freight to the gaining bases, using DoD regional master contract freight charges tables.
- CHAMPUS. The number of visits to the on-base facility, and per-visit cost paid by CHAMPUS to civilian treatment facilities, for the retiree population (retirees and dependents).
- Time-phasing of construction and shut down.

CHAPTER 3

ONE-TIME COSTS AND SAVINGS

In this chapter we explain how COBRA computes the one-time or event-driven costs and savings from the data elements and standard factors.

ADMINISTRATIVE PLANNING AND SUPPORT COSTS

In Year 1, Cost = Losing base BOS cost x planning factor. That result is decreased by 25 percent in each subsequent year.

PERSONNEL ACTIONS COSTS

From the position transfer input, COBRA calculates the actual number of people (as opposed to positions) moving. This set of calculations addresses the problem of predicting whether the current employees of the losing base will choose to relocate, and if so, which of the several gaining bases they would move to.

Notice that the use of Base X as an imaginary location allows for cases in which positions are eliminated but salaries are still being paid because the people are reassigned to fill unfunded or empty slots. Not using Base X causes those people to be treated as eliminated, thereby overstating the salary savings.

Civilian Personnel Actions

Current positions = current positions at losing base (input).

Retirements = current positions x early-retirement rate.

Attrition = current positions x normal turnover.

Employees remaining = current positions

- retirements
- attrition losses.

New positions = new positions at all gaining bases (input).

Number riffed = (employees remaining – new positions) x riffed rate.

The riffed rate factor represents the probability that those people will not be hired into another position in the Federal system; thus, the result of this calculation shows only those people for whom no other position could be found.

Number moving = number needed, or employees remaining, whichever is less.

Percent of need = This year's civilian moves as a proportion of the total positions moving (number moving/number needed). This is used to apportion the remaining civilians to the receiving bases. For instance, if the value is 31 percent, then 31 percent of all new positions at the gaining bases would be filled by transferees; the remainder would be filled through local hiring.

Personnel Actions Costs

Severance pay = number riffed x RIF pay,

where RIF pay = civilian salary x rifpay percent (both are standard factors).

Early retirement.

Pay = Retirements x (civilian salary x retirement pay percent x early pay percent).

Hiring cost = (Number needed – number moving) x cost of hiring new personnel.

MOVING COSTS

Civilian Costs

Househunting: For civilians, airfare plus per diem. All civilians are assumed married.

Airfare = 2 x 2 x distance x airfare per mile.

Per diem = 1.75 x per diem x 5 days

House purchase: For moving civilians only x the percent of homeowners.

House cost = national average x regional construction cost index.

Allowance = house price x allowed percent or ceiling.

Total cost = buy allowance + sell allowance.

Common Costs

Per diem cost = Per diem rate x (30 days + travel time),

where travel time = 350 miles per day.

Miscellaneous cost = Miscellaneous cost rate x total moving.

Privately-owned vehicle (POV) costs = Total moving x POV rate x distance.

Each direct employee moving is assumed to have one car to relocate.

Freight Costs

Percent moving. The military personnel moving in the given year, as a percentage of the entire group of transfers. This value is calculated in order to prorate the transportation costs of equipment and to complete construction if the user elects the automatic option.

Household goods (HHG) cost: For each category (married officers, single officers, married enlisted, single enlisted, and civilians):

Allowable weight x number moving = total weight

Shipping cost = cost per mile x distance

Total cost = total weight x (packing cost + shipping cost)

Pack: Number moving x office equipment x pack cost

Freight: (Office equipment in tons

+ mission equipment

+ support equipment)

x freight rate

x distance

x percent moving

Vehicles: Number of vehicles transported

x transporter cost

x distance

x percent moving

Driving: Number of vehicles driven

x cost per mile

x distance

x percent moving

Losses: Loss rate

x total cost of freight, vehicles, and driving

UNIQUE ONE-TIME COSTS

The environmental and other unique costs (provided as data input as discussed in Chapter 2) are prorated over the first 3 model years.

CONSTRUCTION COSTS

- New construction costs. The construction cost is:

  Standard construction costs

  x regional cost factors

  x new construction square feet needed,

  where new construction square foot needs = the difference between the amount of space a moving activity needs to perform its mission and the capacity already available at the base.

- Rehabilitation costs. The cost to rehabilitate required space is

  Cost = Rehabilitation requirement

  x standard construction cost

  x regional cost factor

  x rehabilitation cost factor,

  where the rehabilitation requirement is the lesser of the existing capacity that must be repaired or the total space requirement of the incoming activity, both items being input data.

- Planning, design, site preparation, and overhead. A factor of 15 percent is added to the construction cost in each year to portray site preparations and overhead costs. In addition, a charge of 10 percent of the total construction cost is added to the first model year to portray the costs of initial planning and design work.

SHUTDOWN COSTS

Cost = Mothball cost per sf x base total sf, for closure or deactivation scenarios only.

ONE-TIME SAVINGS

- Construction and procurement avoidances. The cost avoidances provided as data inputs (as explained in Chapter 2) are applied directly to each year's cash flows.
- Real property transactions

  Land. The cost of land bought and the value of land sold are applied in Year 1 and the sale year, respectively.

CHAPTER 4

RECURRING COSTS AND SAVINGS

In this chapter, we explain the calculation of the recurring costs and savings.

CHAMPUS

CHAMPUS costs are assessed only for deactivation or closure scenarios, because in realignment scenarios, medical assets are adjusted over time. In adjusting medical assets, gains in the number of persons treated at a given facility cannot be predicted with any accuracy. If the base hospital is completely shut down, however, all retirees must be treated by CHAMPUS.

Cost = retired inpatients formerly treated on-base x CHAMPUS cost per visit off base.

The model considers both in- and out-patient treatment through the standard factors. CHAMPUS costs are only incurred after the base is closed.

CARETAKER COSTS

Caretaker cost = Support Cost + Maintenance Cost

Support Cost = BOS equation for caretaker personnel

+ RPMA equation for caretaker space

+ Communications costs incurred

+ Salaries of caretaker force

Maintenance Cost = RPMA equation for closed space

x minimal maintenance factor.

HOUSING COSTS

Changes at the Losing Base

At the losing base, only savings are possible. Those savings are created by bringing people in from off base to fill the houses vacated by departing personnel, thereby eliminating the need to pay off-base allowances.

Savings = (officers x family rate x on-base rate)

x (BAQ + VHA for the losing base),

and likewise for the enlisted family savings.

Changes at the Gaining Base

Total allowance cost = Cost A + Cost B + Cost C, where

Cost A = Off base now, off base at gaining base

= number arriving x percent families x percent off base x

(gaining VHA – losing VHA),

where percent off base = 1 – percent on base, and

percent on base is input data.

Cost B = On base now, off base at gaining base

= (BAQ + new VHA) x number, where

Number = number arriving x percent families x percent on base

– units vacant

– number of units built, and

Number of units built = square feet of housing built

x assignment ratio

divided by square feet per unit,

where assignment ratio = number of units assigned to rank, divided by total number of units built (set at 1/3 for officers, 2/3 for enlisted).

Cost C = Single officers off base (enlisted live on base)

number arriving x (1 – percent families)

x (gaining VHA – losing VHA)

SALARY SAVINGS AFTER PERSONNEL REDUCTIONS

Salary savings = positions eliminated x average salary,

where positions eliminated = original current positions

minus those still on losing base

minus those on all new bases

In each transition year, the savings are reduced by:

Terminal PCS cost = Service average PCS cost

x positions eliminated

and,

Officer Severance Pay = officer positions eliminated

x officer average salary x 80 percent

CHANGES IN BASE OVERHEAD COSTS

RPMA and BOS Costs

The cost RMPA/BOS equations are described in detail in Appendix A. The model calculates a new budget for each base's RPMA and BOS to account for the changes in the base's requirement to support facilities and personnel.

The RPMA is affected by the shutdown phasing plan; that plan is reflected in the user's choice of custom values or model standards as described in Chapter 2.

Family Housing Costs

There are no housing savings if the scenario is a realignment. Otherwise, in each year after the closure/deactivation year, the full housing budget at the losing base is credited as a savings, i.e.:

Savings = Family Housing Budget (input data).

MISSION COSTS

Cost (or savings) = Sum of mission cost at gaining bases

– mission cost at losing base.

CHAPTER 5

MODEL OUTPUTS

COBRA summarizes the costs and savings of realignment and closure scenarios in terms of payback period and net present values. If an action has a net present value cost, it should not be undertaken; if it has a net present value savings, the payback period provides a measure of the speed with which investments will be recouped.

COBRA's findings are displayed in three distinct ways: the "Decision Parameters," described in Chapter 1; the "Realignment Summary," a year-by-year analysis of the cash flows; and the "Budget Summary" section, which reorganizes the cash flows to reflect DoD fund accounts and inflates the cash flows to reflect the expected costs in the actual budget year.

All these output formats are derived from the net cash flow calculations.

NET CALCULATIONS

The net calculations are derived from the annual cash flows, shown in Figure 5-1. The cash flows for the first 5 model years include all the cost elements explained in the preceding chapters. In the years 6 and beyond, steady-state costs are extrapolated, using only the recurring cost elements. Specifically, the outyear costs or savings consist of the following elements:

Salary savings

+ overhead differences

+ housing allowance differences

+ mission cost differences

+ caretaker costs

+ CHAMPUS costs.

	YR1	YR2	YR3	YR4	YR5
Cost	25,396,273	7,954,299	21,407,448	9,346,169	6,914,527

CONTINUING OUTYEAR COST: (9,333,343)

YEAR	COST (HR1 $)	INFLATED $	NPV	BREAKEVEN YEAR
1990	25,396,273	26,158,162	26,158,162	0
1991	7,954,299	8,438,716	33,829,721	0
1992	21,407,448	23,392,497	53,162,364	0
1993	9,346,169	10,519,195	61,065,590	0
1994	6,914,527	8,015,832	66,540,512	0
1995	(9,333,343)	(11,144,500)	59,620,654	0
1996	(9,333,343)	(11,478,835)	53,141,151	0
1997	(9,333,343)	(11,823,200)	47,073,980	0
1998	(9,333,343)	(12,177,896)	41,392,901	0
1999	(9,333,343)	(12,543,233)	36,073,346	0
2000	(9,333,343)	(12,919,530)	31,092,308	0
2001	(9,333,343)	(13,307,116)	26,428,245	0
2002	(9,333,343)	(13,706,329)	22,060,986	0
2003	(9,333,343)	(14,117,519)	17,971,643	0
2004	(9,333,343)	(14,541,045)	14,142,532	0
2005	(9,333,343)	(14,977,276)	10,557,091	0
2006	(9,333,343)	(15,426,594)	7,199,815	0
2007	(9,333,343)	(15,889,392)	4,056,183	0
2008	(9,333,343)	(16,366,074)	1,112,601	0
2009	(9,333,343)	(16,857,056)	(1,643,663)	2009
			breakeven yr:	2009

FIG. 5-1. NET PRESENT VALUE CALCULATIONS

Since all data have been collected in 1988 dollars, the effects of inflation and discounting must be included.

Inflation: Cost = cost x (1 + inflation rate) (year)

Discount: The LOTUS internal NPV calculation function was used to determine the NPV on a cumulative basis. Note that this function assumes an end-of-year accumulation, while COBRA assumes a start-of-year accumulation; thus, the equations had to be adjusted to omit the first year from the NPV string and add it separately at the end of the calculation.

The year in which the NPV turns negative, representing a net savings, is the year in which payback is considered to occur. Notice how the model carries that year

across from the initial counting column to a single entry in the "Breakeven Year" column.

DECISION PARAMETERS

The model's primary output is a set of five decision parameters, described in detail in Chapter 1. Those parameters are calculated as follows:

Payback Period

Payback period = breakeven year

– Year 1 year

– last year of action,

where the breakeven period is determined from the cash flow analysis shown in Figure 5-1, and the Year 1 year and the last year of action are input data items. For example, if the breakeven year calculated is 1996, then the breakeven period is (1996 – 1991) or Year 5. Since the last year of action is Year 4, the payback period is (5 – 4) or 1 year.

Net Present Value

The NPV parameter is taken directly from the 20-year net present value calculations in Figure 5-1.

Net Transition Savings

Value = NPV of all costs and savings over the transition period (Year 1 through the last year of action).

Land Value

Land value = Value of all sales

– value of all purchases,

where both sales and purchases are data inputs.

Annual Steady State Savings

Savings = sum of Year 6 recurring costs and savings, as explained above and shown in Figure 5-1.

THE REALIGNMENT SUMMARY

The Realignment Summary offers a constant-dollars summary of the costs and savings in each year. The arrangement of descriptive lines (see Figure 5-2) is intended to keep clear the distinction between one-time costs and savings, and those which recur. The first three lines – mission, personnel, and overhead – are recurring. The bottom three lines – construction, moving costs, and other – are the one-time costs and savings. The use of constant dollars allows for a ready comparison of changes over each year without the confusion of changing values simply because of inflation. [NOTE: Figure 5-2 is a *cost* screen; savings are shown in parentheses.]

Losing base	Ft. Deluxe, CA	OPTION NPV ($K):	($1,644)
Option package	ALFA	BREAKEVEN YEAR:	19
		COMSN "PAYBACK"	14 YEARS

NET COSTS $K Year 1 constant dollars

	YR1	YR2	YR3	YR4	YR5	BEYOND
Mission	($752)	($1,310)	($2,007)	($2,703)	($3,400)	($3,400)
Personnel	($1,555)	($4,831)	($7,058)	($9,284)	($10,863)	($10,863)
Overhead	$899	$736	$9,214	($874)	($992)	($1,180)
Net const.	$20,611	$10,126	$12,857	$13,652	$13,652	$0
Moving costs	$3,043	$1,187	$2,513	$2,513	$2,513	$0
Other	$3,150	$2,046	$5,888	$6,043	$6,005	$6,110
NET	$25,396	$7,954	$21,407	$9,346	$6,915	($9,333)

FIG. 5-2. THE REALIGNMENT SUMMARY

INTERPRETING THE REALIGNMENT SUMMARY

For information on how the model arrived at the answer or how the answer might be changed, the Realignment Summary suggests where the major influences on the scenario can be found.

The key costs and savings are obviously the larger ones. In most scenarios, the larger numbers appear on the new construction, personnel, and overhead lines. To be successful (achieve payback within 6 years), scenarios must be able to offset large

one-time costs with large annual steady-state savings, and generally this occurs when the value of land sold approaches the cost of new construction required.

The entries under the "BEYOND" column in Figure 5-2 are the steady-state costs or savings. They can only be generated from Mission, Personnel, and Overhead. Ideally, these numbers will be savings (in parentheses) that can be used to offset the one-time costs. If the Annual Steady State Savings reflect a net cost, the scenario cannot achieve payback. The individual lines of the Realignment Summary are explained below.

Mission

Mission costs are those incurred by the activities themselves. Examples include fuel, supplies, contracts, etc., which are not part of the normal base overhead function. Mission savings or costs would be incurred, for example, as a result of moving closer to, or farther away from, training ranges or customers. The key question is: What is the basis for these savings or costs?

Personnel

Personnel costs and savings result from changes in housing allowances and from hirings or layoffs causing increased or decreased payrolls. Key questions are:

- How many people are being laid off, and is the number realistic? Those positions represent a cut in the Service end-strength, not a dispersal to fill unfunded positions.
- How much family housing is to be built at the new base as part of the scenario? If many people are being moved out of base housing to a new base with no new housing, all will draw allowances. Are the old and new allowances comparable? A great difference in allowance levels will magnify the costs incurred if all the new families cannot be housed.

Overhead

The overhead line is largely composed of the changes in RPMA and BOS costs. In the initial years, there is also an administrative planning and support cost; that is usually a small component of the overall cost, but in smaller scenarios may play a major role.

Key questions are:

- What are the moving population and new construction as proportions of the existing population and housing at the gaining base? If the proportions are large, the gaining base overhead budgets should increase significantly.
- What are the current relative budgets for BOS/RPMA? If the scenario greatly increases the gaining base's size, and the losing base had a low budget, the net overhead cost may increase rather than decrease.

Net Construction

The net construction line in Figure 5-2 includes both new construction and construction avoided. The key question is: Is this amount of construction justified? It should not exceed the existing facilities at the losing base, and should be further reduced by the gaining base capacity. Construction avoidances may only be taken if the designated using activity is transferred and if the project is funded at least for design.

Moving Costs

Moving costs include personnel moves and freight requirements, mostly a mechanical matter. If this usually minor item is a significant proportion of the overall cost, the data input for equipment quantities may be erroneous.

Other

The "Other" line includes diverse costs. The major component is the sale and purchase of real estate. Where applicable, environmental cleanup, mitigation of environmental damage, or unique one-time costs defined by the user are applied here.

Under certain scenarios, the early retirement/reduction in force (RIF) pay or new hire costs could be significant. Those costs are dependent on the number of hires/layoffs created by the Position Migration Plan reflected in the migration diagram.

CHAMPUS costs and procurement avoidances are included on the "Other" line but ordinarily have little effect on the model.

THE BUDGET SUMMARY SCREEN

COBRA is a comparative tool. Designed to function with the data that are readily available to major command or Service-level staffs, it estimates the total expected costs or savings attributable to base realignments or closures. It is not designed to portray actual budget data, and its assumptions make estimates for specific budget years unreliable. However, at the request of the Armed Services Committee of the U.S. House of Representatives, a module was included to present the estimated cost in a budgetary form (see Figure 5-3). The costs developed by COBRA are reassigned to DoD budget funding accounts. Again, we caution against assuming that these numbers are ready for immediate use in detailed budgeting.

Losing base	Ft. Deluxe, CA	BUDGET SUMMARY					
Account		1990	1991	1992	1993	1994	BEYOND
SAVINGS	MC	843	869	895	0	0	0
	Land sale	0	0	2,364	0	0	0
	O&M	1,316	4,802	9,111	12,011	14,646	15,085
	MIL PERS	1,933	2,894	3,911	4,986	5,031	5,182
	OTHER	247	255	262	270	278	0
	Subtotal	4,339	8,819	16,543	17,268	19,954	20,267
COSTS	MC	17,833	11,934	15,365	15,826	16,301	0
	MC-Design	6,203	0	0	0	0	0
	O&M	4,636	2,888	22,503	11,679	11,910	8,788
	MIL PERS	547	563	580	598	0	0
	ENVIR	0	2,125	2,189	0	0	0
	OTHER	0	0	0	0	0	0
	Subtotal	29,219	17,511	40,637	28,103	28,211	8,788
NET COSTS		24,879	8,692	24,094	10,835	8,256	(11,479)

FIG.5-3. THE BUDGET SUMMARY

The figures in the budget summary screen include all the costs and savings covered in the earlier text. However, in order to accommodate DoD accounting, the costs and savings had to be reassigned to different lines of the table. As a result, one-time and recurring costs become intermingled. In addition, to provide budget year estimates, the values had to be inflated. As a result, none of the numbers (including

those in Year 1) can be recognized immediately from anywhere in the model, since all other numbers are either constant-year dollars or discounted dollars.

CONCLUSION

COBRA is the most sophisticated tool available to perform headquarters-level analysis of base costs. We recommend that it be adopted by all Services as a common tool for analysis, and that the factors upon which COBRA depends be refined through experience and further analysis to produce an even more dependable estimate. We also recommend that actual budget submissions for specific base realignments or closures be based upon actual base data and on-site analysis rather than COBRA's standard factors. COBRA should be the decision tool by which the right scenario is selected, but at this stage of development, it cannot be expected to duplicate the accuracy of data specific to individual bases.

GLOSSARY

Office symbols of Service activities have not been included.

AFLC	=	Air Force Logistics Command
AFSC	=	Air Force Systems Command
BAQ	=	Basic Allowance for Quarters
BOS	=	Base Operating Support
CER	=	Cost Estimating Relationship
CHAMPUS	=	Civilian Health and Medical Program of the Uniformed Services
COBRA	=	Cost of Base Realignment Actions
DCBRC	=	DoD Commission on Base Realignment and Closure
DLA	=	Defense Logistics Agency
HHG	=	Household goods
HUD	=	Housing and Urban Development
LMI	=	Logistics Management Institute
MAC	=	Military Airlift Command
MC	=	Military Construction
MRP	=	Maintenance of Real Property
MTMC	=	Military Traffic Management Command
NPV	=	Net Present Value
O&M	=	Operations and Maintenance
OBOS	=	Other Base Operating Support
OMB	=	Office of Management and Budget
PCS	=	Permanent Change of Station
POV	=	Privately-Owned Vehicle

RIF	=	Reduction in Force
RITA	=	Reimbursement on Income Tax Allowance
RPMA	=	Real Property Maintenance Activity
SAC	=	Strategic Air Command
SF	=	Square Foot
SIOH	=	Supervision, Inspection, and Overhead
SY	=	Square Yard
TAC	=	Tactical Air Command
TA(MTOE)	=	Tables of Authorizations (Air Force) or Modified Table of Organization and Equipment (Army)
TDY	=	Temporary Duty
VHA	=	Variable Housing Allowance

APPENDIX A

BASE OVERHEAD COST PARAMETERS

APPENDIX A

BASE OVERHEAD COST PARAMETERS

Base overhead costs can be separated into two major fund accounts: Real Property Maintenance Activities (RPMA) and Base Operations Support (BOS). In addition, COBRA treats communications costs as part of BOS because those costs are largely based on the number of employees in the base overhead structure. Family Housing expenses are handled as a completely separate issue, as described in Chapter 4.

During the Commission's deliberations, each Military Service provided models explaining their overhead expenditures. In some cases, a zero-based linear model was proposed; in other cases, a fixed-plus-variable cost model was suggested. Typical cost curves for such models are shown in Figures A-1 and A-2.

LMI's earlier research[1] had indicated that base overhead costs are most accurately estimated by an exponential model (shown in Figure A-3). The Services, however, were unable to develop the data needed to produce the coefficients for the exponential model within the short time available to the Commission. The COBRA model as distributed with this report contains the zero-based linear model used for Air Force and Navy bases. LMI has developed an exponential model because it best portrays real cost determinants; further research, however, is required to determine the appropriate coefficients for each Service or major command.

COMPARING THE THREE MODEL APPROACHES

RPMA costs are those incurred to maintain buildings and grounds and are related to the quantity of buildings and grounds on the base. In the Commission's study, the Army developed an RPMA model based on the number of employees at the installation, because facilities are sized in proportion to the number of authorized employees. BOS costs are based on the number of personnel employed. Since

[1]Cost Estimating Relationships for Real Property Maintenance Activity at Army Installations, Report ML207, Logistics Management Institute, January 1983; Myers, Myron; Paul McClenon, and William Woodring.

COBRA considers both costs in the same way, the following discussion will apply to both BOS and RPMA, and we will use the term "per unit" to mean "per person" or "per square foot."

The Zero-Based-Linear Model

The zero-based linear model is expressed by the equation, Cost = bx, and is depicted by the heavy "Service-wide cost equation" line in Figure A-1. That line predicts the overhead cost for a base of a given size using the Service coefficients. It is quickly apparent that using Service averages will reflect no economies of scale: the overhead cost per unit on each base is the same regardless of the size of the base. For example, bases A, B, and C on the graph experience the same cost per unit even though they are of much different size). However, many functions must be performed on every installation, no matter how small; while for large bases, adding a few more activities does not necessarily cause a significant increase in the size of the base overhead workforce or cost. Further, because of climatic or cost-of-living differences, all bases have somewhat different per-unit operating costs.

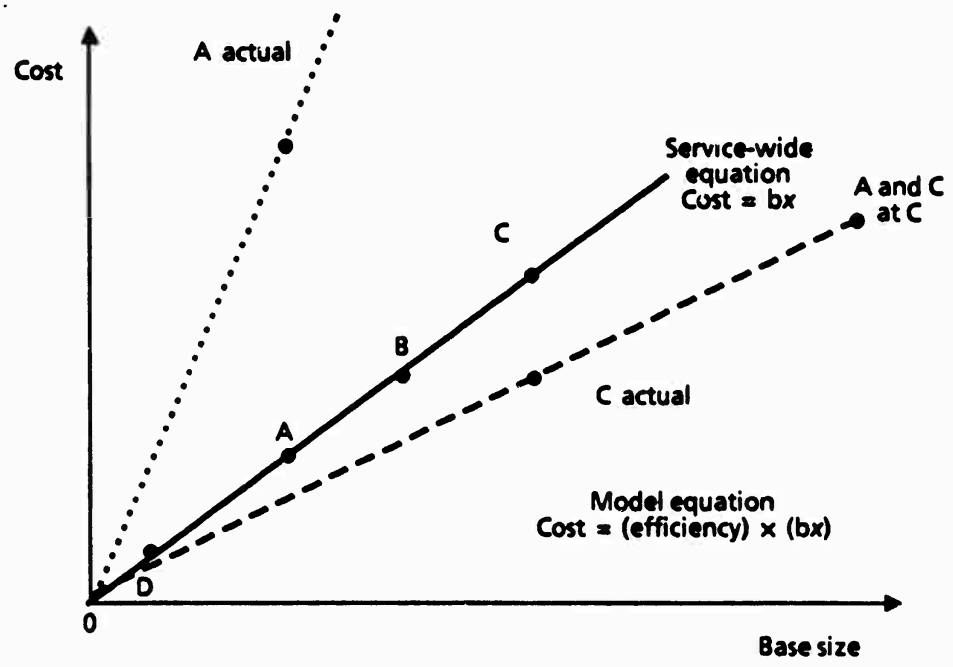

FIG. A-1. THE ZERO-BASED LINEAR MODEL

For the Commission's process, COBRA adjusted this deficiency with base "efficiency factors," which essentially modified the universal linear relationship to pass through the actual cost points (lines 0-A actual and 0-C actual). This achieves the effect of changing the slope of the graph lines at each base – changing the cost per unit, in other words. If there are economies of scale, the larger bases, falling as they do on the right of the graph, will tend to display shallower slopes, or lower per-unit costs, than bases to the left. In any event, bases which are more expensive to operate will be distinguished clearly.

One of the weaknesses of this zero-based model is that costs are projected along the 0-actual line for each base (e.g., 0-A actual or 0-C actual) even though the base size changes. In Figure A-1, Base A may achieve economies of scale if the base grows, and may even seem expensive now, precisely because it is overbuilt and undermanned. The model, however, would predict ever-increasing costs along the line 0-A actual as more people are added. In addition, because of the reduction of costs to zero rather than to a fixed cost, there are no inherent advantages of closing a base as opposed to realigning activities from one base to another.

The model did work for the Air Force scenarios against which it was applied for two reasons:

- The losing bases were closed, rather than deactivated, so that all costs for the bases did become zero.
- The gaining bases were large operating bases reflecting the "A and C at C" scenario in Figure A-1, rather than a move of C to A which would have resulted in an extremely high cost along the 0-A actual line (somewhere off the top of the page). The achievement of net savings depends on an appropriate selection of bases, because "A and C at C" may or may not be less expensive than the cost to operate A and C separately.

The "efficiency factor" still does not account for the fact that there may be certain levels of expenditure which are unavoidable regardless of the base size or operating tempo: in other words, fixed costs. Therefore, closing a base will result in a greater savings of overhead than transferring equal numbers of people from one base to another, because rather than reducing the overhead cost, we can eliminate it altogether. The straight-line model is unable to reflect that situation: closure is little different from transferring most of the people (moving from B to D, or B to 0 in the figure). Capturing the difference between closure and almost closing is important in the case of a base deactivation, where the facilities are closed but not

disposed of; the answer lies in the assessment of some component of cost which does not vary proportionately with the underlying variable. The Army, which was the only Service in the Commission's deliberations facing this scenario, presented a fixed-plus-variable cost model.

The Fixed-Plus-Variable Cost Model

The conventional solution to many operating cost problems is to identify a certain fixed cost (which is borne regardless of the size of the installation), coupled with a cost which depends on the number of "units" (people or square feet) as shown in Figure A-2. This cost model is expressed through the equation, Cost = a + bx. The primary weakness is that the "fixed" component of overhead is not really the same at all bases: performing minimal maintenance on a very small base should be less expensive than doing so at a large base. In fact, we found several cases (Bases A and C in the figure) where the entire budget of smaller bases was less than the Service-wide approximation of "fixed costs": that would imply a negative per-person cost of service.

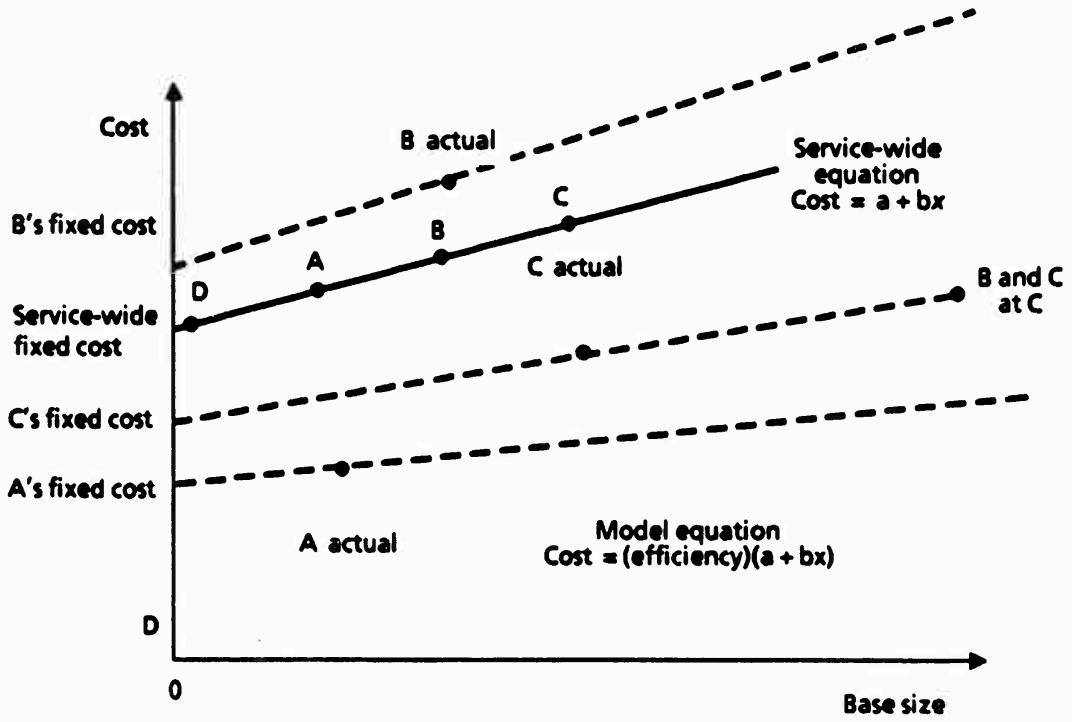

FIG. A-2. THE FIXED-PLUS-VARIABLE COST MODEL

Again, COBRA used efficiency factors to reduce the effect of this problem. COBRA's efficiency factor alters both the per-square-foot cost (the slope of the line) and the fixed cost (the intercept) while adjustng predicted costs to actual budget levels. Note that the total cost of moving everything at B to base C (B and C at C) is clearly less than the combined cost of operating both B and C.

Using this approach smooths out real differences in per-square-foot cost from one base to another which are portrayed in the zero-based linear model. As a result, cost savings from base realignments are quite insignificant, unless the base actually closes, allowing recovery of the fixed cost. The model offers an inherent cost advantage to inexpensive bases because the efficiency factor makes the variable cost line shallower for bases operating below the predicted costs; that encourages the selection of the less-expensive bases as better receiving bases.

However, in a base deactivation (base D), the model predicts that the full fixed overhead cost will continue to be incurred. If that were so, it would be pointless to deactivate a base, yet we know that substantial overhead cost reductions will occur as required services are reduced or eliminated. Ideally, we would have a way to reflect the elimination of these "fixed" costs as the installations get smaller and pass the thresholds below which the services are not, in fact, required.

What is necessary is a model that takes advantage of:

- The zero-based linear model's ability to capture differing per-capita costs
- The fixed-plus-variable cost model's recognition that there are economies of scale
- Some way of showing differing levels of "fixed" costs.

The Exponential Model

Research suggests that the most supportable model – one which has the advantage of intuitive conformity with experience and meets those requirements noted above – takes the exponential form shown in Figure A-3. This has the added attraction of being able to take the form of either of the two foregoing models if the appropriate coefficients are supported by the data. Further, the steady dropping of the curve as the origin is approached actually approximates a series of fixed-plus-variable cost curves (see Figure A-4), much as suggested in the previous paragraphs. This approach, then, combines the best features of the other models in recognizing

differing per-unit costs, and a fixed-cost component that nonetheless varies somewhat with the scale of the installation.

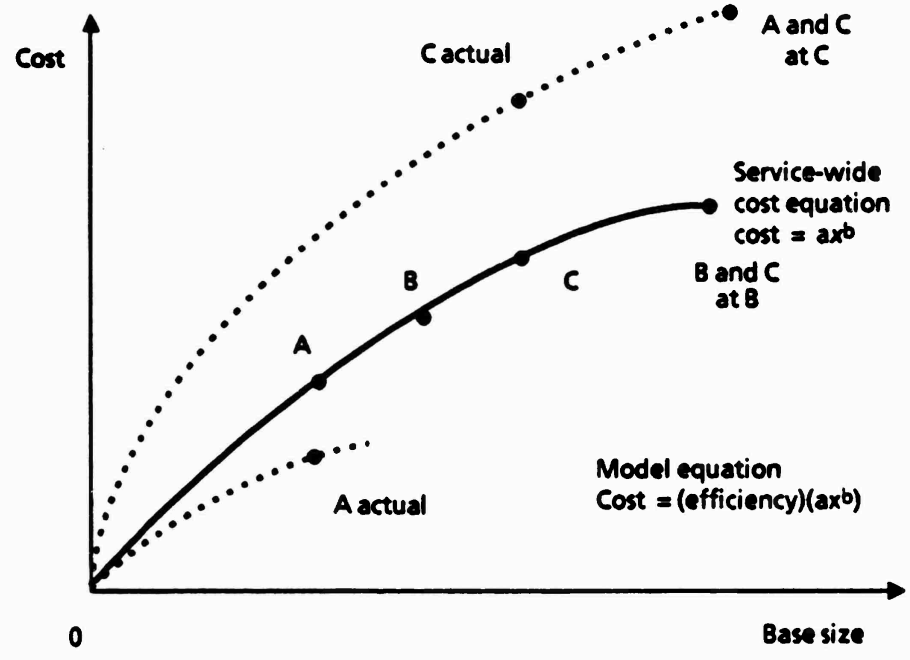

FIG. A-3. THE EXPONENTIAL MODEL

In this model, the COBRA efficiency factor has the effect of expanding or shrinking the curve to approximate the correct size for a specific base. That varies both the conceptual "fixed" cost and the slope of the curve (the per-square-foot cost). Bases A, B and C are shown as examples; notice that the large expensive base C still may allow cost savings: that is, the cost of A and C at C may be less than the combined cost of A and C operating independently. Large savings could be achieved by moving C to B.

The curve shown is notional: the exact shape of the curve for a given Service or MACOM would vary depending on the coefficients used in the cost equation.

COBRA Calculation of Overhead

COBRA includes two components of cost for RPMA: costs attributable to maintenance of buildings, based on a square foot measurement, and costs

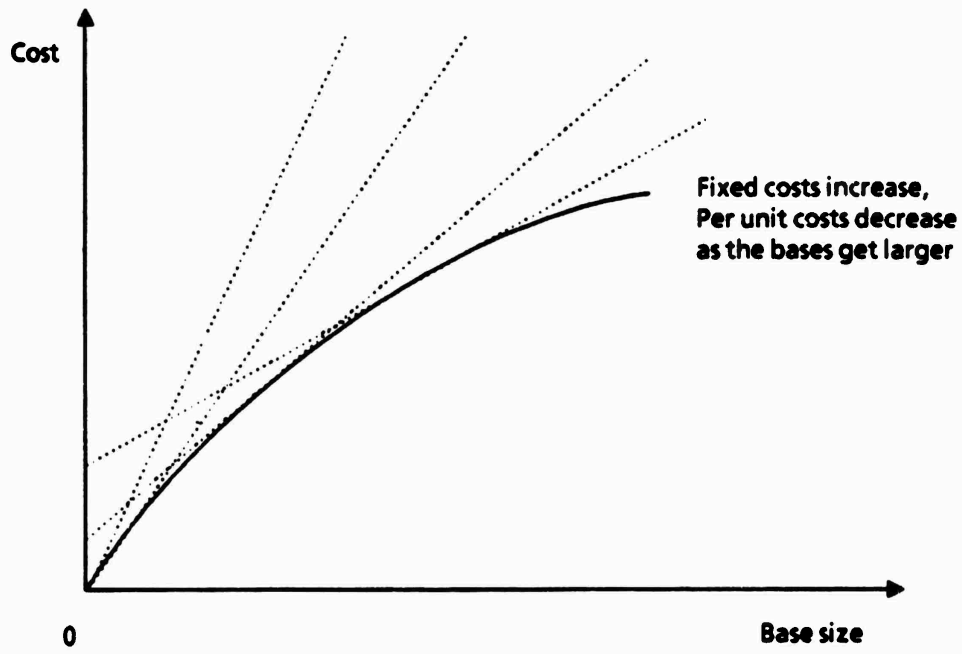

FIG. A-4. EXPONENTIAL AS SUCCESSIVE APPROXIMATIONS

attributable to grounds maintenance, based on an acreage measurement. The equations contained in COBRA for RPMA are:

$$\text{RPMA budget} = \text{efficiency} \times a(X_1^b)(X_2^c),$$

where efficiency = actual budget divided by predicted budget
X_1 = square feet of facilities (data input)
X_2 = average on installation (data input)
and a, b, c are model coefficients.

The predicted budget assumes efficiency at 1 to allow the calculation of the efficiency factor. In determining new budgets, the square footage is incremented at the gaining bases by any new construction, and decremented at the losing base by the amount of facilities deactivated, if any. New construction is not assessed a maintenance fee in the first 2 years. Acreage is increased at the gaining bases starting in Year 1 by the amount of any land purchased, and decreased at the losing base beginning in the sale year by the amount of any land sold.

The BOS equations are very similar.

RPMA budget = efficiency x d(X_3^e)

Where efficiency = actual budget divided by predicted budget
X_3 = number of military and civilian employees (data input)
and d, e are model coefficients.

Again, the predicted budget assumes efficiency at 1 to allow the calculation of the efficiency factor. In determining new budgets, the populations of the gaining and losing bases are increased or decreased by the position changes for each year. Notice for the losing base that the use of position change data avoids discussion of whether a given employee moved or was attrited in place.

APPENDIX B

STANDARD FACTORS

APPENDIX B

STANDARD FACTORS

This appendix lists the values used for the 67 standard factors included in the COBRA model. They are displayed in four tables, showing the values for each factor as applied in the variants of the model and used for each of the Services. Entries that are printed in bold show cases in which the Services submitted factors differing appreciably from the data originally provided by the Air Force.

Each table of 12–18 elements is followed by a source reference for the element values, as provided by the Services. In many cases, references are missing for the DLA because no model runs were required by the Commission for DLA bases and therefore no data validation was necessary.

TABLE B-1 - PERSONNEL

Description	COBRA	Army	Air Force Opers[a]	Air Force Other	DLA	Navy
% Officers Married	75	75	75	75	75	70
% Enlisted Married	60	60	60	60	60	67
Dependents per family	2.75	2.75	3.26	3.26	2.75	2.50
Officer's Salary	$64,441	64,441	64,167	64,167	64,441	61,448
Officer BAQ - single	$ 5,013	5,013	5,364	5,364	5,013	5,167
Officer BAQ - w/depen	$ 6,048	6,048	6,471	6,471	6,048	6,349
Enlisted Salary	$27,029	27,029	28,952	28,952	27,029	26,925
Enlisted BAQ - single	$ 2,483	2,483	2,657	2,657	2,483	2,760
Enlisted BAQ - w/depen	$ 3,635	3,635	3,889	3,889	3,635	4,063
Civilian Salaries	$35,000	27,020	32,518	32,351	31,000	38,250
% Civilian turnover	30	30	29	29	14	29
% Civilian early Retir	8	8	17.5	17.5	5	17.5
% Civ. RIF pay factor	60	60	40.7	40.7	0	0
% Civ. RIF's, not hired	25	25	4	4	0	4
% Civ. retired pay factor	70	70	70	70	0	70
% Early retired pay factor	70	70	100	100	70	100
New Hire Cost	$ 5,000	5,000	0	0	5,000	0
Nat. Av. Home Price	125,000	125,000	95,000	95,000	88,000	95,000

Note: Acronyms are defined at the end of the main text.
[a]Opers includes MAC, TAC, SAC; Other includes AFLC, ATC, AFSC.

SOURCE OF STANDARD FACTORS USED IN TABLE B-1

Note: Office symbols of Service activities have not been included in the Glossary.

% Officers Married
- Commission - Air Force data.
- Army - Air Force data.
- Navy - Navy Family Housing Survey Data.
- Air Force - SAF/ACBOJ & AF/DPPB
- DLA - Air Force data.

% Enlisted Married
- Commission - Air Force data.
- Army - Air Force data.
- Navy - Navy Family Housing Survey Data.
- Air Force - SAF/ACBOJ & AF/DPPB
- DLA - Air Force data.

Dependents per Family
- Commission - Air Force data.
- Army - Air Force data.
- Navy - Navy Family Housing Survey Data.
- Air Force - AFR 173-13, Para 3-11.
  Civ - 2.75, Officer 3.55, Enlisted 3.31
  Mil Avg = 3.55 x 17% + 3.31 x 83% = 3.35
  Tot Avg = 3.35 x 85% + 2.75 x 15% = 3.26
- DLA - Air Force data.

Officer's Salary
- Commission - Air Force data.
- Army - Air Force data.
- Navy - Average 03-04. Navy (MNPO) values FY 1988 dollars.
- Air Force - AFR 173 - 13, Table 3-3.
- DLA - Air Force data.

Officer BAQ - Single
- Commission - Air Force data.
- Army - Air Force data.
- Navy - Weighted average calculations from Navy Family Housing Survey data.
- Air Force - Pay Table from 7 January 1988 issue of Pentagram. Increased by 7% raise in BAQ for FY 1989.
- DLA - Air Force data.

Officer BAQ - with Dependents

Commission	- Air Force data.
Army	- Air Force data.
Navy	- Weighted average calculations from Navy Family Housing Survey data.
Air Force	- Pay table from 7 January 1988 issue of Pentagram.
DLA	- Air Force data.

Enlisted Salary

Commission	- Air Force data.
Army	- Air Force data.
Navy	- Average E4-E5. Navy (MNPO) values FY 1988 dollars.
Air Force	- AFR 173 - 13, Table 3-3.
DLA	- Air Force data.

Enlisted BAQ - Single

Commission	- Air Force data.
Army	- Air Force data.
Navy	- Weighted average calculations on Navy Family Housing Survey data.
Air Force	- Pay table from 7 January 1988 issue of Pentagram.
DLA	- Air Force data.

Enlisted BAQ - with Dependents

Commission	- Air Force data.
Army	- Air Force data.
Navy	- Weighted average calculations on Navy Family Housing Survey data.
Air Force	- Pay table from 7 January 1988 issue of Pentagram.
DLA	- Air Force data.

Civilian Salaries

Commission	- Assumed.
Army	- Air Force data.
Navy	- Average Navy wide civilian grade of 8.6 ($25,000 * 1.53).
Air Force	- AFR 173 -13, Table 3-9. Adjusted by dividing out funded portion (18.61%) of benefits and multiplying by total (funded and unfunded) benefit factor (29.49%)
DLA	- Air Force data.

% Civilian Turnover

Commission - Air Force data.
Army - Air Force data.
Navy - Air Force
Air Force - Overall civilian turnover - 13% OCPO
Normal civilian retirement - 8% AF Magazine, May 87, p.75
Turnover due to attrition - 5%
Attrition, realignment - 20% AF/DP
Attrition, closure - 28% AF/DP
Avg attrition (20% + 28%)/2 = 24%
Total Attrition 29%
DLA - Defense Logistics Agency data.

% Civilians Eligible for Early Retirement

Commission - Air Force data.
Army - Air Force data.
Navy - Air Force data.
Air Force - Retirement, Realignment - 7% AF/DP
Retirement, Closure - 12% AF/DP
Avg Retirement (7% + 12%)/2 = 9.5%
Normal Retirement Rate - 8.0%
Total Retirement 17.5%
DLA - Defense Logistics Agency data.

Civilians RIF Pay Factor

Commission - Air Force data.
Army - Air Force data.
Navy - Navy data.
Air Force - AF "typical" civilian; 43 years old with 14 years service
Avg base pay $32,518/1.2949 = $25,112
Severance Pay; $25,112/52 x 18 weeks = $ 8,693
(Time- in-service)
8,693 x 3 years x 10% = 2,608 (Age)
25,113/52 x 4 week = 1,932 (Accrued Leave)
$13,233
% of Composite : $13,233/$32,518 = 40.7%
Severance Pay Formula/AF "typical" from 1988 Federal Personnel Guide.
DLA - Defense Logistics Agency data.

% Civilian Riffed, Not Hired

Commission - Air Force data.
Army - Air Force data.
Navy - Air Force data.
Air Force - AF/DP.
DLA - Defense Logistics Agency data.

% Civilian Retired Pay Factor

Commission - Air Force data.
Army - Air Force data.
Navy - Air Force data.
Air Force - DCBRC Cost Task Force
DLA - Defense Logistics Agency data.

% Early Retired Pay Factor

Commission - DCBRC Cost Task Force.
Army - DCBRC Cost Task Force.
Navy - DCBRC Cost Task Force.
Air Force - DCBRC Cost Task Force.
DLA - DCBRC Cost Task Force.

Cost Incurred in New Hiring

Commission - DCBRC Cost Task Force.
Army - DCBRC Cost Task Force.
Navy - Air Force data.
Air Force - AF/DP. The "actual" hiring costs are negligible unless the amount of incoming personnel requires overtime or hiring temporary employees.
DLA - DCBRC Cost Task Force.

Average National Home Sale Price

Commission - Air Force data.
Army - Air Force data.
Navy - Air Force data.
Air Force - National Assc. of Realtors.
DLA - Defense Logistics Agency data.

TABLE B-2 - INSTALLATION SUPPORT

Description	COBRA	Army	Air Force Opers[a]	Air Force Other	DLA	Navy
RPMA Cost Coefficients						
1. Acreage		0				
2. Buildings (SF)		0	5.68	4.46		
3. Personnel		761				
MRP (Curr. Plnt Value)						.018
RPMA Costs FIXED		$12M	0	0		
BOS Coefficient (times affected population)		683	1,604	2,500		2,768
BOS Cost Fixed		$11M	0	0		
Support for move coeff.	0.1	0.1	0.1	0.1		0.1
Caretaker costs						
Admin. Space needs	58,546	58,546	58,546	58,546	0	58,546
Comm. costs per SF	2.54	2.54	2.64	2.64	0	2.54
% orig. RPMA cost	0.1	0.1	0.01	0.01	0	0.1
Mothball cost per SF	$	1	1	1	1	0
1						
% Tax Reimb. (RITA)	28	28	28	28	28	28
% Civ. Home Sale Reimb.	10	10	10	10	10	10
% Home Purchase Reimb.	5	5	5	5	5	5

[a]Opers includes MAC, TAC, SAC; Other includes AFLC, ATC, AFSC.

SOURCE OF STANDARD FACTORS USED IN TABLE B-2

Base Operations and Maintenance Coefficients

Commission	- Service specific data.
Army	- Army data.
Navy	- Navy data.
Air Force	- AFCSTC/OSF. FY 89 Life Cycle Cost Factors for Installation Support Report, July 88.
DLA	- Defense Logistics Agency data.

Support for Move Coefficient

Commission	- DCBRC Cost Task Force.
Army	- DCBRC Cost Task Force.
Navy	- DCBRC Cost Task Force.
Air Force	- DCBRC Cost Task Force.
DLA	- DCBRC Cost Task Force.

Caretaker Cost Administrative Needs

Commission	- Air Force data.
Army	- Air Force data.
Navy	- Air Force data.
Air Force	- Mather AFB Closure Study.
DLA	- Defense Logistics Agency data.

Caretaker Cost Communications

Commission	- Air Force data.
Army	- Air Force data.
Navy	- Air Force data.
Air Force	- Mather AFB Closure Study.
DLA	- Defense Logistics Agency data.

Caretaker Cost % Original RPMA

Commission	- Air Force data.
Army	- Air Force data.
Navy	- Air Force data.
Air Force	- Nominal.
DLA	- Defense Logistics Agency data.

Mothball Cost

Commission	- Air Force data.
Army	- Air Force data.
Navy	- Air Force data.
Air Force	- Nominal. Reasonable in the opinion of two ALC civil engineers.
DLA	- Defense Logistics Agency data.

Tax Reimbursement (RITA)

Commission	- Joint Travel Regulations.
Army	- Joint Travel Regulations.
Navy	- Joint Travel Regulations.
Air Force	- Joint Travel Regulations.
DLA	- Joint Travel Regulations.

% Civilian Home Sale Reimbursement

Commission	- Joint Travel Regulations.
Army	- Joint Travel Regulations.
Navy	- Joint Travel Regulations.
Air Force	- Joint Travel Regulations.
DLA	- Joint Travel Regulations.

% Home Purchase Reimbursement

Commission	- Joint Travel Regulations.
Army	- Joint Travel Regulations.
Navy	- Joint Travel Regulations.
Air Force	- Joint Travel Regulations.
DLA	- Joint Travel Regulations.

TABLE B-3 - TRANSPORTATION

Description	COBRA	Army	Air Force Opers[a]	Air Force Other	DLA	Navy
Material per assigned person (lbs)	710	710	710	710	710	710
Military light vehicle cost per mile	$ 0.75	0.75	0.32	0.32	0.75	0.57
Military vehicle cost/mile	$2	2	3.79	3.79	2.00	3.79
% Shipping loss rate	2	2	2	2	2	2
Total HHG packing/pound	$ 0.22	0.22	Calc	Calc	0.47	Calc
HHG cost/cwt - pack	$ 6.69	6.69	6.94	6.94		6.94
HHG cost/cwt - store	$ 7.80	7.80	13.01	13.01		13.01
HHG cost/cwt - unpack	$ 6.69	6.69	6.94	6.94		6.94
HHG cost/cwt - misc	$ 0.73	0.73	0.76	0.76		0.76
HHG weight/officer family	7,000	7,000	14,750	14,750		14,750
HHG weight/enlisted family	4,000	4,000	7,500	7,500		7,500
HHG weight/military single	2,000	2,000	8,400	8,400		8,400
HHG weight/civilian	17,000	17,000	17,000	17,000		17,000
POV reimbursement/mile	$ 0.15	0.15	0.20	0.20		0.20
Air trans./passenger mile	$ 0.30	0.30	.12	.12	0.30	0.094
Misc. expense/direct empl.	$ 595	595	368	384	5,000	368
% Civ. homeowning rate	75	75	53.7	53.7	75	53.7
% Rcut. PCS costs/per/3 yrs	5,000	5,000	1,351	1,351		4,328
Average Officer PCS Cost	$6,332	6,332	6,332	6,332		
Average Enlisted PCS Cost	$3,827	3,827	3,827	3,827		

[a]Opers includes MAC, TAC, SAC; Other includes AFLC, ATC, AFSC.

SOURCE OF STANDARD FACTORS USED IN TABLE B-3

Material Per Assigned Person
- Commission - Air Force data.
- Army - Air Force data.
- Navy - Air Force data.
- Air Force - SM-ALC/MME Study.
- DLA - Air Force data.

Military Light Vehicle Cost Per Mile
- Commission - Air Force data.
- Army - Air Force data.
- Navy - Based on 35 mph rate; FAC 164 data.
- Air Force - AFR 173 - 13, Table 2-10.
- DLA - Air Force data.

Military Heavy Vehicles Cost Per Mile
- Commission - Air Force data.
- Army - Air Force data.
- Navy - Air Force data.
- Air Force -
- DLA - Air Force data.

Shipping Loss Rate
- Commission - DCBRC Cost Task Force.
- Army - DCBRC Cost Task Force.
- Navy - DCBRC Cost Task Force.
- Air Force - DCBRC Cost Task Force
- DLA - DCBRC Cost Task Force.

Household Goods Cost Per CWT - Pack
- Commission - Air Force data.
- Army - Air Force data.
- Navy - Air Force data.
- Air Force - MTMC, HHG.
- DLA - Air Force data.

Household Goods Per CWT - Store
- Commission - Air Force data.
- Army - Air Force data.
- Navy - Air Force Data
- Air Force - Rate Solicitation #10.
- DLA -

Household Goods Per CWT - Unpack

Commission - Air Force data.
Army - Air Force data.
Navy - Air Force data.
Air Force - Rate Solicitation #10.
DLA -

Household Goods Cost Per CWT - Miscellaneous

Commission - Air Force data.
Army - Air Force data.
Navy - Air Force data.
Air Force - Rate Solicitation #10.
DLA -

Household Goods Weight Per Officer Family

Commission - Air Force data.
Army - Air Force data.
Navy - Air Force data.
Air Force - AF Times, 10 October 1988.
[17,000# (Maj) + 14,500 # (Capt)]/2 = 15,750# (max)
15,750# - 1,000# = 14,750 #. (Not reasonable to cost to max.)
DLA -

Household Goods Weight Per Enlisted Family

Commission - Air Force data.
Army - Air Force data.
Navy - Air Force data.
Air Force - [9,000# (E-5) + 8,000# (E-4)]/2 = 8,500#
8,500# - 1,000# = 7,500#
DLA -

Household Goods Weight Per Military - Single

Commission - Air Force data.
Army - Air Force data.
Navy - Air Force data.
Air Force - 14,000# (Maj) x .2 + 7,000# x .8 = 8,400#
DLA -

Household Goods Weight Per Civilian

Commission - Joint Travel Regulation.
Army - Joint Travel Regulation.
Navy - Joint Travel Regulation.
Air Force - Joint Travel Regulation.
DLA -

Privately Owned Vehicle Reimbursement Per Mile

Commission	- Joint Travel Regulation.
Army	- Joint Travel Regulation.
Navy	- Joint Travel Regulation.
Air Force	- Joint Travel Regulation.
DLA	-

Air Transportation Per Passenger Mile

Commission	- Assumed
Army	- Commission.
Navy	- Air Force data.
Air Force	- MAC Com'l Airlift Price Div.
DLA	- Defense Logistics Agency data.

Miscellaneous Expense Per Employee

Commission	- Joint Travel Regulation.
Army	- Joint Travel Regulation.
Navy	- Joint Travel Regulation.
Air Force	- Joint Travel Regulation.
DLA	- Defense Logistics Agency data.

Civilian Homeowning Rate

Commission	- Air Force data.
Army	- Air Force data.
Navy	- Air Force data.
Air Force	- HUD, Economics Division.
DLA	-

Routine PCS Costs Per Person Per 3 Years

Commission	- Air Force data.
Army	- Air Force data.
Navy	- Air Force data.
Air Force	- AFR 173 - 13, Table 3-3.
DLA	-

Average Officer PCS Cost, CONUS

Commission	- Air Force data.
Army	- Air Force data.
Navy	-
Air Force	- AFR 173 - 13, Table 3-8.
DLA	-

Average Enlisted PCS Cost, CONUS

Commission	- Air Force data.
Army	- Air Force data.
Navy	-
Air Force	- AFR 173 - 13, Table 3-8.
DLA	-

TABLE B-4 - CONSTRUCTION

Description	COBRA	Army	Air Force Opers[a]	Air Force Other	DLA	Navy
Horizontal ($/SY)	50	50	50	50	50	
Aviation Oper. ($/SY)						47
Communication Ops. ($/SF)						173
Waterfront ($/linear foot)	75	75	75	75	75	
Waterfront Oper. (FB)						9,968
Air Operations ($/SF)	112	112	112	112	112	
Other Oper. ($/SF)						121
Operational ($/SF)	85	85	85	85	85	
Training ($/SF)						112
Aviation/Prod						114
Ship Maint./Prod. ($/SF)						109
Other Maint./Prod						95
RDT&E ($/SF)						147
POL Supply/Storage ($/BL)						73
Ammo Supply/Storage ($/SF)						163
Other Supply/Storage ($/SF)						85
Medical ($/SF)						158
Administrative ($/SF)	82	82	82	82	82	106
School Buildings ($/SF)	75	75	75	75		
Maintenance shops ($/SF)	85	85	85	85	85	
Bachelor Qtrs ($/SF)	72	72	72	72		
Troop Housing/Mess ($/SF)						88
% Off. Qtrs constr'd						10
% Enl. Qtrs constr'd						90
Other Per. Sup/Ser ($/SF)						107
Family Quarters ($/SF)	51	51	51	51		
Family Housing ($/FA)						79,000
% Hsg Req'd to be constr'd						10
Covered storage ($/SF)	50	50	50	50	50	
Dining Facilities ($/SF)	157	157	157	157	157	
Recreation ($/SF)	80	80	80	80	80	
% Rehab. vs New Constr.	60	60	60	60	60	60
% for utilities						10
Av. Size Bach. Qtrs (SF)	125	125	125	125	125	
Av. Size Fam. Qtrs (SF)	1,100	1,100	1,414	1,414	0	
Date Factors Approved		17 Oct	26 Oct	26 Oct	2 Nov	

[a]Opers includes MAC, TAC, SAC; Other includes AFLC, ATC, AFSC.

SOURCE OF STANDARD FACTORS USED IN TABLE B-4

% Rehabilitation Cost Versus New Construction

Commission	- DCBRC Cost Task Force.
Army	- DCBRC Cost Task Force.
Navy	- DCBRC Cost Task Force.
Air Force	- DCBRC Cost Task Force.
DLA	- DCBRC Cost Task Force

Average Size of Bachelor Enlisted Quarters

Commission	- DCBRC Cost Task Force.
Army	- DCBRC Cost Task Force.
Navy	- DCBRC Cost Task Force.
Air Force	- DCBRC Cost Task Force.
DLA	- DCBRC Cost Task Force

Construction Unit Costs

Commission	- OASD(P&L) memorandum dated 9 September 1988, Guidance on Area Cost Factors for Department of Defense Facilities Construction.
Army	-
Navy	- Navy has 20 established Investment Codes.
Air Force	- Proposed budget unit costs were calculated by adjusting the proposed engineering unit cost to include a 10 percent contingency and 5.5 percent SIOH cost.
Defense Agency	- Commission data

APPENDIX C

DETAILED MODEL INPUTS

APPENDIXC

DETAILED MODEL INPUTS

COBRA requires four types of data input to produce a scenario cost estimate. Those types are: Scenario Definition, Base Statistics, Construction Inventories, and Other Inputs.

SCENARIO DEFINITION INPUTS

The user must define the scenario to be estimated.

Scenario-Wide Definition

As explained in Chapter 1, this definition includes:

- Type of scenario (closure, deactivation, or realignment).
- Last year of action (i.e., the year before "steady state" begins).
- Close year. The year in which real property is to be sold. This data element is also assumed to be the year in which shutdown occurs (if not otherwise specified), housing savings begin to be realized, and CHAMPUS costs begin to be incurred.
- Year 1. The four digits (e.g., 1989) of the first year are used to assign calendar years to the annual cash flows for the model output and to inflate the costs from the constant 1988 dollars used in the bulk of the model.
- Inflation and discount rates. COBRA uses fixed rates. The inflation rate is set at 3 percent, the official figure being used by DoD at the time. The discount rate is the 20-year Treasury Bond rate (average of 10- and 30-year rates). OMB Circular A-104 is the guiding manual on this subject.

Transfer Data

- Names of the losing and gaining bases.
- Distance. The distance in miles from the losing base to the gaining base. If Base X is used, the distance to it should be 1,500 miles unless some rationale exists for another value. If the distance is less than 50 miles, no personnel transfer or freight costs are assessed. Otherwise, the distance is

used to determine travel costs, automobile mileage reimbursements, and freight costs.

- Moving mission and support equipment. The weight in short tons of all the transferring mission and support equipment other than the vehicles (accounted for below). No great importance is attached to the precise definition of mission and support weights because the model simply adds them together. The distinction was made because many installations already have known mission equipment weights as part of their mobilization plans, reducing the amount of estimation required to produce the data.

- Military light vehicles. The number of vehicles which will be driven to the destination. This is used to calculate the cost required to drive the vehicles (as opposed to freighting or auto-transporting them) to their destination bases.

- Heavy or special vehicles. The number of vehicles that must be transported to their destinations because it is impractical or too expensive to drive them. This is used to calculate a cost of transportation.

- Environmental mitigation requirements. The cost of putting environmental mitigation measures into place at the gaining bases.

- Special one-time costs. These are unique one-time expenditures which cannot be portrayed properly anywhere else in the model. Such costs may be special transportation costs for high-value equipment, or new acquisitions of equipment or facilities which cannot practically be transferred from the closing base. In the Commission's model, these costs were simply included in the data block for "Environmental mitigation," with explanatory notes.

- Position Transfers.

  - Affected personnel at the losing bases include all mission and overhead military and civilian personnel. Caretaker forces for the years after buildings are closed must be identified separately. At the gaining bases, the positions are all those positions newly created, both mission and support.

  - If Base X has been created to account for positions that will be dispersed into the Service's force structure, those positions must be recorded.

  - The position flows record the data as it is maintained by military planners, showing the number of personnel at each installation in each year, not the number moving each year. The incremental calculations are made by the model.

The data are used to determine the number of positions actually eliminated and the changes in the number of people to be supported at each installation.

Real Property Transactions

- Facility square feet shut down. The total square footage of space no longer used after the moves. This number is used for computation of BOS/RPMA savings and caretaker force costs, and should represent only the facilities used in determining the BOS/RPMA algorithms.

- Real property purchases. Real property purchases include sales of property at the losing base and any purchases needed at the gaining base. These may occur for realignments as well as transfers: the departure of an activity may allow severance of real property without undue interference, and arrival of a major new element may require facilities to be built on land that must be bought. The value of bought and sold land should be assumed to be that of raw commercial, residential, or industrial land in the installation's region unless more accurate data are available. These data are used to calculate the one-time costs or savings due to real property purchases.

- Year excessed. The year in which real estate proceeds are expected to be realized. This information is used to assign real property sales to the correct year. Purchases are assumed to be necessary in Year 1.

BASE STATISTICS

Base statistics are used to describe the bases involved in the scenario so that their operating costs can be compared and an assessment can be made of the probable impact of the scenario on each base's costs.

Physical Environment

- Base total military employment, civilian employment, facilities, and acreage. These data are used to compute the bases' new RPMA and BOS costs (see Appendix A). Therefore, only the personnel or square footage that are included in the cost algorithms should be considered.

- Housing units vacant. This information should be obtained from the installation's Form 1377. The model assigns incoming personnel to vacant units before determining the number of families that must be paid allowances to live off-base.

- Families living on base (%). Enter the percentage of military families living on the closing base as compared with the total number of military families assigned to the base. This information is used to determine how many quarters at the losing base can be reassigned to off-base families. It also

distinguishes between families moving to the gaining base who will incur a marginal cost of the difference in off-base housing allowances, and those who formerly lived on base and now incur the cost of both Basic and Variable allowances.

Base Expenditure Data

- Base costs. These costs are used to calculate the change in each base's overhead as a result of changing support requirements.
  - RPMA budget: The total RPMA budget, less any portion spent on housing (program element code [PEC] xxx94). The payroll and nonpayroll components of this cost are treated separately to avoid double-counting of the personnel savings, already identified through the personnel position data.
  - Communications budget. The base communications budget (PEC xxx95). Some Service accounting systems do not distinguish effectively between BOS and communications, which is not a major problem because the two numbers are combined before use.
  - Base operations budget. The total base operations budget (PEC xxx96). Again, direct hire (military or civilian) payrolls are accounted for on separate lines. However, service contracts (which obviously include contractor payrolls) should not be subtracted from BOS non-payroll totals because those positions are not double-counted by the transfer of direct-hire personnel.
  - Family housing budget. The total family housing budget for the base.
- Activity mission costs. This data element is used to capture the increased efficiency in mission costs (PEC xxx97) achieved by a realignment of activities. The data may be expressed by considering the current cost as zero (at the losing base), and determining any anticipated changes after the activities are transferred. Alternately, a total cost for the activities in both the gaining and losing bases can be calculated.

CONSTRUCTION INVENTORY

The construction data elements are used to convert predictable space requirements into a dollar-value construction cost in a systematic way, avoiding subjective snap judgments on the possible cost of new facilities.

- Gaining area cost factor. The tri-Service construction cost factor that adjusts for regional cost differences.
- Requirements. Based on the type of activity being transferred, a minimum facilities configuration is required to support the force. This data element

records the square footage requirements, by building category, for each of the gaining bases. Base X has no construction requirements.

- Capacity. Enter the available excess square footage on each gaining base. This area represents the base's capacity to accept a new activity without new construction.

- Rehabilitation. The number of square feet of available capacity on each gaining base that is in need of rehabilitation before it can be used effectively. The model requires all excess space to be rehabilitated before new construction is permitted.

OTHER INPUTS

- Personnel costs.

  - Officer and enlisted VHA (variable housing allowance). The VHA for each base is entered as the weighted average by grade (total VHA paid divided by total recipients). It is used to determine the change in cost of housing allowances between the gaining and receiving bases. Notice that Basic Allowance for Quarters (BAQ) is treated as a Standard Factor because it does not vary from base to base.

  - Per diem. The permanent change of station (PCS) per diem rate. Base X, if used, should be assigned the Service average for those allowances. The data are used to compute the relocation allowances for travel time.

- Cost avoidance. These data are used to record one-time savings.

  - Construction. The value of construction that has entered or passed the design stage, by year, which will no longer be necessary if the base closing or the intended using activity is transferred.

  - Procurements. The value of current contracts *not* included in mission, RPMA, or BOS costs. This level of expenditure is assumed to continue through the outyears. If transferring an activity or base closure will result in contract termination penalties, those penalties should be subtracted from any savings. In addition, termination penalties on mission, BOS, or RPMA contracts at the losing base should be reflected here.

- Freight costs per ton-mile. The cost to transport freight to the gaining bases, using DoD regional master contract freight charges tables, given the distance to be traveled and the total of mission and support equipment tonnage (provided earlier). This is used to calculate the cost to transport freight.

- CHAMPUS. The number of visits to the on-base facility, and per-visit cost paid by CHAMPUS to civilian treatment facilities, for the retiree

population (retirees and dependents). These data are collected for both inpatient and outpatient retirees. If the base hospital is not the regional catchment center, zero cost is assessed because the increased retiree workload at the regional center generated by the closure of the base hospital is offset by the decreased active-duty workload.

- Time-phasing of construction and shut down. Unless otherwise directed, COBRA assigns construction costs based on the proportion of people moving; when 30 percent of the people move in a given year, COBRA assigns 30 percent of the construction costs to that year. In addition, shutdown costs and changes in overhead costs at the losing base assume that all closure happens in the last year of activity. The Commission model had no override capability; the present version does allow the user to identify a different phasing of both construction and facilities shutdown. Note that if the automatic option is selected, the phasing plan displayed on the screen is not the calculated plan; those calculations may result in a significant different phasing.